

Critical species of Odonata in the Levant

Wolfgang Schneider

Hessisches Landesmuseum, Department of Zoology, Friedensplatz 1,
D-64283 Darmstadt, Germany. <w.schneider@hlmd.de>

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ABSTRACT

Of the 86 Odonata species so far recorded for the Levant, four are considered as endangered (*Calopteryx hyalina*, *C. syriaca*, *Ceriagrion georgifreyi*, *Pseudagrion torridum hulae*), six as vulnerable (*Coenagrion vanbrinckae*, *P. sublactum mortoni*, *Gomphus kinzelbachi*, *Onychogomphus macrodon*, *Brachythemis fuscopalliata*, *Crocothemis sanguinolenta*), and two as extinct (*Rhyothemis semihyalina syriaca*, *Urothemis edwardsi hulae*). The history of odonatological research in the Levant is outlined. The creation of protected areas for vulnerable and endangered species is suggested and a number of suitable sites proposed.

INTRODUCTION AND REGIONAL DEFINITION

The geographical area covered by this article lies roughly between 37° and 29°N and 34° and 48°E and encompasses the territories of the modern states of Lebanon, Syria, Iraq, Israel, Palestine, Jordan, and part of Turkey (see also Kalkman et al., 2004). The northern and eastern boundaries are formed by high mountain ranges (Pontic Alps, Anatolian mountain ranges, Zagros mountains), the southern by the Syrian/Arabian desert, and the western by the east Mediterranean coast. The biogeographical composition and complexity of its fauna is easily explained by the geographical position: it is situated at the crossroads of the Palaearctic, Indoasiatic, and Afrotropical regions, forming a transition zone and functioning as a faunal filter (Por 1975; Krupp & Schneider 1988). A more detailed analysis of the regional odonate fauna is given by Schneider (1986).

As a rough approximation, the region is usually divided into three climatic zones, each mainly characterised by the amount of annual precipitation and its seasonality: (1) the fertile crescent with humid winters (five months with rainfall between 375 and 250 mm) and dry summers (Mediterranean coast, northern Syria, and Mesopotamia); (2) the steppes surrounded by the fertile crescent with only two to four humid winter months (between 250 and 100 mm of precipitation) and very dry summers; and (3) the Syrian desert with almost no rainfall throughout the year. The present day limnetic drainage system (Fig. 1) is characterised by the predominance of internal ("endorrheic") catchment basins; these are from north

to south: Nahr al-Quaiq (III), Sabkhat al-Jabbul (V), Palmyra basin (VI), Damascus basin (X), the Jordan/Dead Sea drainage (IX), Wadi as-Sirhan drainage (XI, with the famous al-Azraq Oasis), and the al-Jafar drainage (XII). In the north, Ceyhan (I) and Orontes (II) drain into the Mediterranean, followed by a number of short (and now often intermittent) rivers (VII) along the coastal mountain ranges of Syria, Lebanon and Israel, only interrupted by the Litani river (VIII), the lower course of which is a former coastal river. The rivers Euphrates and Tigris and their tributaries form the largest drainage system (IV) and flow into the Arabian/Persian Gulf.

So far 86 species of Odonata have been recorded in the region. As can be expected from a transition zone, the species composition is a mixture of elements from various zoogeographic origins. The Indoasiatic influence is not very strong and decreases from east to west. The number of Afrotropical elements decreases from south to north, while the number of taxa of Palaearctic origin does so from north to south. Although the regional endemism is restricted to the specific (12 taxa) and subspecific (nine taxa) level (Table 1), it proves that the Levant is not only a transition zone but has also served (and still serves) as a speciation centre. Endemics are recruited from Afrotropical and Palaearctic lineages only.

STATE OF THE ART

The only comprehensive and recent synopses on the Odonata of the Levant are those of Schneider (1986) and Dumont (1991). Prior to and after these works only smaller contributions were published.

The Levantine species that were known in the 19th century were published in the "Revue des Odonates" by Selys & Hagen (1850); therein the chapter 'Asie mineur' is the first synopsis of east Mediterranean Odonata. This commented list is basically a critical review of collections carried out by the dipterologist H. Loew in southern Turkey, the results of which, including descriptions of new taxa, had already been published by Schneider (1845). In the following decades Levantine odonates are mentioned and described only in taxonomic revisions on the generic and family level, in species lists, and in short notes (Selys 1853, 1854, 1862, 1863, 1869; Selys & Hagen 1854, 1858; Hagen 1863; Brauer 1868, 1876).

The publication of "Odonates de l'Asie mineure" (Selys 1887) finally marks a corner stone in the history of odonatological research of the Levant. The progress achieved becomes evident when one compares the number of taxa to numbers in previous works: Selys & Hagen (1850) listed 30 taxa, Hagen (1863) listed 51, and, finally, Selys (1887) reached 83 nominal species and subspecies. Despite the fact that again several new endemic species are described, the Levant is still treated as an unimportant annex of "Asia minor" (modern Turkey), and the Odonata fauna of the Near East is amazingly classified as "essentiellement européenne". This incomprehensible interpretation was almost certainly influenced and biased by the political and historical views of the time.

Important papers were then published by Morton (1919, 1920a, 1920b, 1921, 1924) and Schmidt (1939). More recently, a series of papers by Dumont (1972, 1973, 1974, 1975, 1977) and Schneider (1981a, 1981b, 1982, 1985, 1987) increased

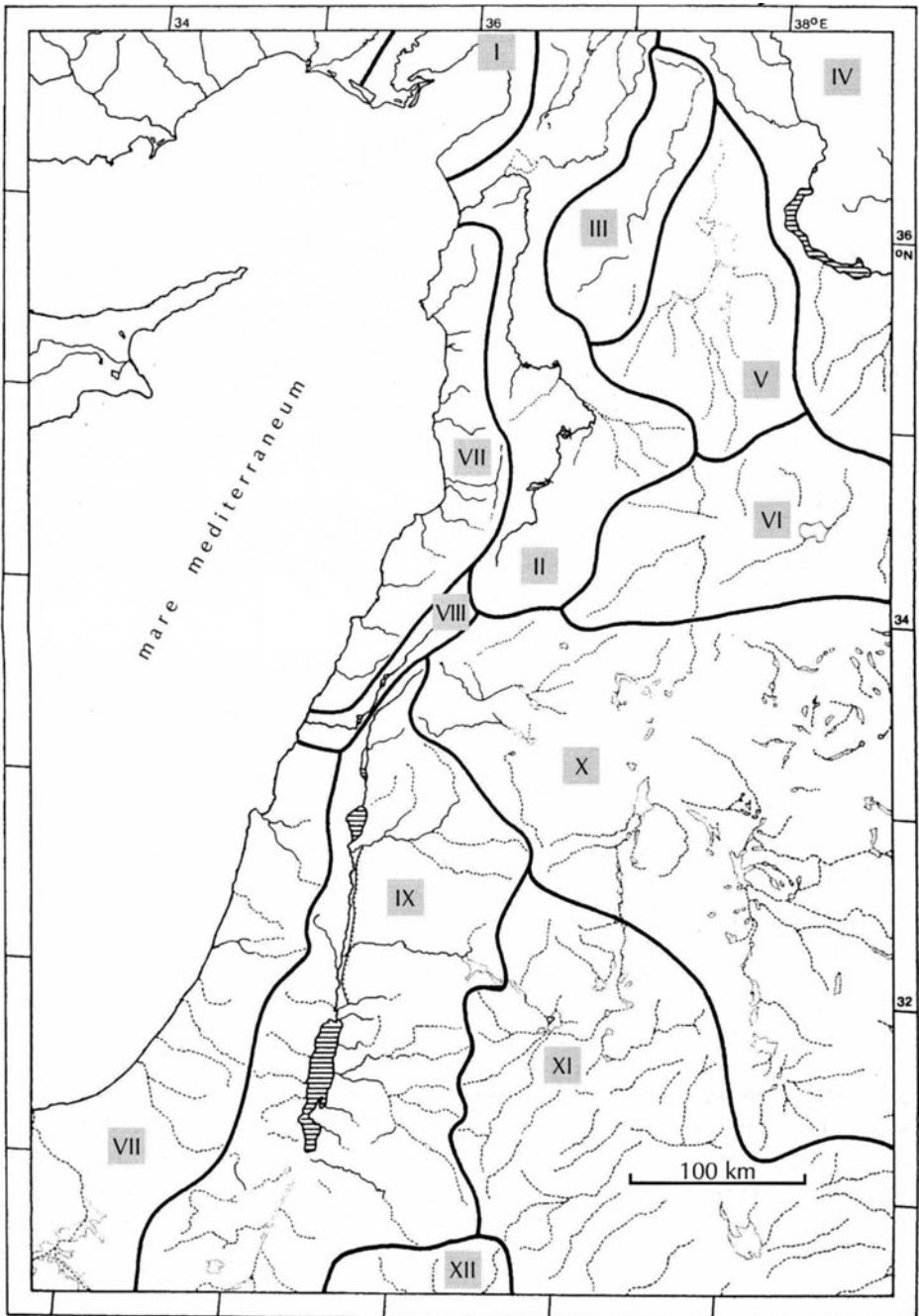


Figure 1: Main catchment and drainage basins of the Levant — I: Ceyhan; II: Orontes (Nahr al-Asi); III: Nahr al-Quaiq; IV: Euphrates/Tigris; V: Sabkhat al-Jabbul; VI: Palmyra basin; VII: coastal rivers of the eastern Mediterranean; VIII: Litani river; IX: Jordan/Dead Sea drainage; X: Damascus basin with Nahr al-Barada; XI: Wadi as-Sirhan drainage with al-Azraq Oasis; XII: Al-Jafar drainage; from Schneider (1986).

our knowledge considerably. A check-list for Jordan was published by Katbeh-Bader et al. (2002). Further regional papers containing information of possible interest to the reader are by Sage (1960a, 1960b), St. Quentin (1964), Lohmann (1992, 1993), De Marmels (1995) and Kalkman et al. (2003).

The only valid identification guide available to the general public and scientific community today is that of Dumont (1991). Properly used, it will lead to a correct identification and point out problems to be solved.

CRITICAL SPECIES

Moore (1997) lists five species occurring in the region; the same are included in the global Red List of threatened species (IUCN 2003):

as endangered (EN)

Calopteryx syriaca and *Onychogomphus macrodon*;

as vulnerable (VU)

Onychogomphus assimilis, *Paragomphus sinaiticus* and *Brachythemis fuscopalliata*.

I agree with Kalkman et al. (2004) in the ranking of regional species but include subspecies because of their importance for the understanding of evolutionary processes in the Levantine transition zone. Taxon-wise the endemism is not significantly higher in the eastern than in the western Mediterranean, but the high level of endemism on the subspecific level indicates the important role of the Levant as a functioning faunal filter.

Table 1. List of selected Odonata taxa occurring in the Levant with regional distribution, IUCN ranking on the Red List of threatened species (IUCN 2003), suggested status, and remarks; contentious taxa are omitted. — IRQ: Iraq; ISR: Israel; JOR: Jordan; LBN: Lebanon; SYR: Syria; TUR: Turkey. EX: extinct; EN: endangered; VU: vulnerable; DD: data deficient. Roman numerals refer to the main catchment and drainage basins, given in Figure 1.

Species	Regional distribution	IUCN	Present	Remarks
Calopterygidae				
<i>Calopteryx hyalina</i> Martin, 1909	ISR, JOR, SYR	-	EN	Endemic (II, VII, VIII, IX, X)
<i>syriaca</i> Rambur, 1842	ISR, JOR, LBN, SYR	EN	EN	Endemic (II, VII, VIII, IX, X)
Coenagrionidae				
<i>Agriocnemis sania</i> Nielsen, 1958	ISR	-	-	Relict distribution (VII, IX)
<i>Ceriagrion georgifreyi</i> Schmidt, 1953	ISR, SYR, TUR	-	EN	Endemic (I, VII, IX); habitat requirements restricted
<i>Coenagrion pulchellum</i> (Vander Linden, 1825)	SYR, TUR	-	-	Relict distribution (II)
<i>syriacum</i> (Morton, 1924)	ISR, LBN, SYR, TUR	-	-	Endemic (I, II, VII, VIII, IX, X)

Species	Regional distribution	IUCN	Present	Remarks
Coenagrionidae (continued)				
<i>Coenagrion vanbrinckae</i> Lohmann, 1993	LIB, SYR, TUR	-	VU (?), DD	Endemic? Taxonomic status and distribution unclear
<i>Enallagma cyathigerum</i> (Charpentier, 1840)	SYR	-	-	Only one record (Martin 1926)
<i>Pseudagrion sublacteum mortonii</i> Schmidt, 1936	ISR, JOR, SYR	-	VU	Endemic (southern part of VII, IX); relict distribution
<i>syriacum</i> Selys, 1887	ISR, JOR, LBN, SYR, TUR	-	-	Endemic (I, II, VII, VIII?, IX)
<i>torridum hulae</i> Dumont, 1974	ISR	-	EN	Endemic (IX), restricted range
Gomphidae				
<i>Gomphus davidi</i> Selys, 1887	ISR, JOR, LBN, SYR, TUR	-	-	Endemic
<i>kinzelbachi</i> Schneider, 1984	IRQ, also IRAN	-	VU (?), DD	Endemic; restricted range?
<i>Onychogomphus macrodon</i> Selys, 1887	ISR, JOR, SYR, TUR	VU	VU, DD	Endemic (I, II, IV, IX); restricted range
<i>Paragomphus sinaiticus</i> (Morton, 1929)	ISR, JOR	VU	-	
Cordulegastridae				
<i>Cordulegaster insignis</i> (Schneider, 1845)	LBN, SYR	-	DD	
Libellulidae				
<i>Brachythemis fuscopalliata</i> (Selys, 1887)	IRQ, ISR, JOR, SYR, TUR	VU	VU	Endemic (I, II, IV, IX); restricted range
<i>Crocothemis chaldaeorum</i> Morton, 1920	IRQ	-	DD	Endemic (IV)
<i>sanguinolenta</i> (Burmeister, 1839)	ISR, JOR	-	VU (?), DD	Relict distribution (IX)
<i>Libellula pontica</i> Selys, 1887	ISR, JOR, SYR, TUR	-	DD	Endemic? (I, II, VII, IX)
<i>Orthetrum abbotti</i> Calvert, 1892	JOR	-	-	Relict distribution (IX)
<i>Rhyothemis semihyalina syriaca</i> (Selys, 1849)	ISR	-	EX	Endemic (IX)
<i>Sympetrum arenicolor</i> Jödicke, 1994	IRQ, SYR, TUR	-	DD	
<i>Urothemis edwardsii hulae</i> Dumont, 1975	ISR	-	EX	Endemic (IX)

It is here suggested that several taxa be added to the list of endangered or vulnerable species (see also Table 1); the reason for inclusion is given in parenthesis:

extinct (EX)

Rhyothemis semihyalina syriaca and *Urothemis edwardsi hulae*.

endangered (EN)

Calopteryx hyalina (endemic with restricted range, habitat destruction), *Ceriagrion georgifreyi* (endemic with restricted range, habitat destruction), *Pseudagrion torridum hulae* (endemic with extremely restricted range, habitat deterioration).

vulnerable (VU)

Coenagrion vanbrinckae (endemic with restricted range), *Pseudagrion sublacteum mortoni* (endemic with restricted range), *Gomphus kinzelbachi* (obviously a very rare endemic), *Crocothemis sanguinolenta* (relict with restricted range).

CRITICAL SITES AND THREATS

In an arid region where water resources are scarce, freshwater habitats are a priori in danger of overexploitation and destruction. I agree with Kalkman et al. (2004) that the destruction of natural habitats in response to the increasing demand for water is the main cause for changes in the composition of the odonate fauna (and the freshwater fauna in general), while pollution is mainly of local influence. The use of the restricted water resources is of highest economic importance and therefore a very sensitive issue, very often leading to political crises between the countries of the region.

Water engineering has irreversibly changed some important freshwater habitats in the Levant, the drainage of the Ghab Valley along the Orontes in Syria and of Lake Hula along the headwaters of the Jordan river being prominent examples. The latter led with certainty to the extinction of a high number of freshwater organisms, including Odonata (Dimentman et al. 1992). The construction of dams for water storage and the pumping of water for irrigation and drinking have also created problems. The Nahr al-Barada once fed the oasis of Damascus but is no longer in existence; even its source (Nab' al-Barada) is now dry and as a consequence important odonate populations (*Calopteryx hyalina*, *C. syriaca*) are lost for ever. The Nahr al-Balikh, once a major tributary to the Euphrates in Mesopotamia (Syria), no longer reaches this river. In the Jordanian desert the unique wetlands of the Azraq Oasis comprised 12 km² of marshes, pools, water meadows, and springs; due to pumping for drinking water most of the wetland has disappeared. Numerous other examples could be listed here, but unfortunately no systematic account on the condition of major freshwater sites in the Levant is available.

CONSERVATION PRIORITIES AND RECOMMENDATIONS

An inventory of all important freshwater habitats and an evaluation of their condition is urgently needed and would be a first step in promoting conservation.

A constant monitoring by local scientists is also needed as our present knowledge is based on scattered field observations only and is therefore fragmentary. In the meantime the creation of protected areas for vulnerable or endangered species would be the appropriate conservation measure. Special attention should be directed to the following sites:

- coastal rivers with seepage-fed habitats as Nahr Sana and Nahr al-Kabir (South) in Syria
- wetlands along the Orontes river in the Ghab Valley and around the former Lake Amiq (Amik Gölü)
- Ain az-Zarqa in Lebanon, main source of the Orontes river (Krupp & Schneider 1988)
- Nahr al-Khabur, a tributary of the Euphrates in northern Syria including its source Ra's al-Ain (Schneider & Krupp 1996)
- Ammiq wetlands on the Litani river in the Bekaa Valley, Lebanon (El-Hage 1979)
- Headwaters of the Jordan river to Lake Tiberias, including former Lake Hula (Dimentman et al. 1992)
- Selected springs and wadis along the Jordan river and around the Dead Sea, e.g. Ain Gedi, Ain az-Zarqa, Ain al-Haditha (Hamidan & Mir 2003), Wadi Mujib
- Al-Azraq Oasis in Jordan

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